TECHNICAL PROJECT MANAGEMENT PLAN
Lake Tahoe Basin Special Framework Groundwater Study
Lake Tahoe Basin, California and Nevada

1.0 BACKGROUND

The Lake Tahoe Basin is implementing a basin wide Environmental Improvement Program (EIP) that is budgeted in excess of $900 million over the next10 years. The EIP is designed to address identified environmental thresholds.

Projects in the EIP will be executed through the cooperation of several private, non-profit, local, state and Federal agencies. Projects include planning, design, construction, and operation phases. Additionally, these same organizations will be simultaneously executing non-EIP projects in the basin. The Lake Tahoe basin has a complex permitting system with multi-agency and overlapping agency jurisdiction and oversight. An active public provides an additional level of oversight. The field season is also limited by the alpine climate. These factors combine to create a limited program implementation horizon.

Lake clarity has been degrading in Lake Tahoe as documented over the last 30 years. This decrease in clarity has been attributed to accelerated eutrophication due to an increase in nutrients being discharged into the lake (Thodal 1997). Efforts to determine the sources of nutrient and particulate pollutants have been ongoing for several years. Several potential sources have been identified with groundwater being an important source. Some research into the effects of groundwater on lake water quality has been conducted (e.g., Loeb 1987, Thodal 1997), but further assessment is needed. Likely sources of nutrient contribution to the lake through groundwater are residual effluent from past sewage disposal practices, fertilizer application, and infiltration of urban runoff. Sewage conveyance lines have also been identified as a potential source. Camp, Dresser & McKee (CDM) has been tasked with studying the risks associated with the conveyance lines.

2.0 PROJECT GOALS AND OBJECTIVES

The goal of this study is to estimate nutrient loading (phosphorus and nitrogen) to Lake Tahoe through groundwater, determine known and potential nutrient sources, and recommend potential nutrient reduction alternatives. This information will be used by the Corps to determine potential projects that could be executed to reduce the nutrient loading to the lake from groundwater, by the Tahoe Regional Planning Agency (TRPA) to meet its management goals and by the Lahontan Regional Water Quality Control Board to determine Total Maximum Daily Loads (TMDLs). This study will increase our understanding of nutrient cycling in the basin and provide revised estimates of nutrient contributions through the groundwater system that are a component of the eutrophication processes reducing lake clarity.

The special framework groundwater study will consolidate and evaluate information about the loading of nutrients to Lake Tahoe by way of groundwater. The study will focus on a re-evaluation of existing data and the limited compilation of new data generated since the study of Thodal (1997) with a goal of identifying land use practices (current and historic) that could be contributing to nutrient loading to the groundwater system. These results will be presented in terms of loading by political regions and in terms of total loading to Lake Tahoe. No sampling is expected as part of this phase of the study. Recommendations on future work that could be carried out to improve groundwater quality and ultimately lake clarity will be included in the report.

3.0 SCOPE

Throughout the duration of the project, team meetings will be conducted to allow stakeholders input on the scope of work, provide stakeholders updates on the progress of the study and to allow stakeholders to contribute data useful to the goals of the project. It is expected that these meetings will be held on a monthly basis.

The project will commence with a literature search. Data collected will be used to develop an estimate for nutrient loading to Lake Tahoe transported through groundwater. The effort will be focused on compiling existing knowledge of groundwater flow characteristics, geology and existing groundwater and nearshore lake nutrient data for the Tahoe Basin. This

information will be linked with identified nutrient source data collected as described in the following paragraph. The nutrient loading to the lake through groundwater will be reported on a regional basis (e.g., by county or some other relevant delineation).

EDS will compile data on current and past land use practices in order to develop a better understanding of potential sources and nutrient routing through the basin. Potential sources include the fertilization of lawns, golf courses, and ski slopes, and the infiltration of road and municipal runoff. Past land uses with the potential to be a current source of nutrients to the lake include abandoned septic tanks and former sewage disposal areas. Stakeholders will be contacted to identify existing maps of the Lake Tahoe Basin land uses. Data gaps will be filled using land use maps, tax records, aerial photographs, discharge permits, nearshore lake data and field surveys, as available. The information will be compiled into a data management system that is compatible with TIIMS.

Alternatives for reducing the nutrient loading to Lake Tahoe through groundwater will be assessed. The identification of best management practices (BMPs) will be included to identify measures for reduction of nutrient loading to Lake Tahoe. Potential projects that could be executed to reduce the nutrient loading to the Lake will also be presented as part of the study.

Throughout the entire process, EDS will provide recommendations for additional work that would be useful in gaining a better understanding of the influence of groundwater on Lake Tahoe. Recommendations will be made on methods to fill data gaps through field sampling, refining the knowledge of the geology of specific areas, and further source assessments to determine a more accurate nutrient loading to Lake Tahoe from groundwater.

The information listed above will be presented in two reports. A groundwater study report will be submitted to the local stakeholders for their use in developing TMDLs and updating the Regional Plan and Forest Management Plan. A second report will be developed as an Appendix to the authorization report. The appendix to the authorization report will focus on Corps projects that could be executed to reduce the amount of nutrients reaching the lake through groundwater.

4.0 DELIVERABLES AND SCHEDULE

The following deliverables and milestones shall be completed and/or submitted on or before the required date of completion.

Deliverable or Milestone	Time Frame	Duration	Cost	Required Date of Completion
Attend monthly team meetings to brief on progress (2-6 people attending each meeting with travel expenses, 14 meetings over a 14 month period)	1 Jan 02 – 30 Jun 03	18 days	$38,600	Monthly
Kick-off meeting (3 people attending)	17 Dec 01	4 hours	$1,200	17 Dec 01
Initial stakeholder meeting to discuss scope (4 people attending, no travel expenses)	23 Jan 02	1 day	$3,600	23 Jan 02
Draft Technical Project Management Plan (2 people working part time over a period of 3 weeks)	1 Jan 02 – 16 Jan 02	3 weeks	$16,200	16 Jan 02
Final Technical Project Management Plan (2 people working part time over a period of 2 weeks)	TBD	2 weeks	$4,400	TBD
Interim Study Update (preparation time and 4 people attending with travel expenses)	1-2 Apr 02	2 days	$6,500	Apr 02
Attend public and stakeholder meeting to discuss study (preparation time and 4 people attending with travel expenses)	13-14 May 02	2 days	$6,500	14 May 02
Data Collection/Nutrient Loading Estimation (10 people working part time over a period of 33 weeks, including travel expenses)	1 Feb 02 – 31 Mar 03	59 weeks	$250,700	31 Mar 03
In Progress Review	24-31 May 02	1 week	$1,700	31 May 02
Reduction Alternatives Formulation (6 people working part time over a period of 16 weeks, including travel expenses)	1 Jan 03 – 13 May 03	19 weeks	$48,000	13 May 03

Deliverable or Milestone	Time Frame	Duration	Cost	Required Date of
Draft Special Framework Groundwater Study Report (10 people working part time over a period of 7 weeks)	1 Mar 03 – 13 May 03	10 weeks	$50,700	13 May 03
Independent Technical Review and Comment Resolution Conference (6 people attending with travel expenses)	13 May 03 – 9 Jun 03	4 weeks	$5,000	9 Jun 03
Final Special Framework Groundwater Study Report (10 people working part time over a period of 2 weeks)	9 Jun 03 – 30 Jun 03	3 weeks	$16,700	30 Jun 03
TOTAL	**1 Jan 02 – 30 Jun 03**	**18 months**	**$450,000**	**30 Jun 03**
*Feasibility Scoping Meeting (F3)	TBD	1 day	$0	TBD
*Alternative Formulation Briefing (F4)	TBD	1 day	$0	TBD
*District Engineer's Public Notice	TBD	1 day	$0	TBD

Note: *Some milestones indicate work beyond the initial year's work.

5.0 BUDGET

The following table includes a list of team members and their estimated time and cost for completion of the Final Special Framework Groundwater Study Report by 30 June 2003.

Title	Employee	Unit Cost	Total
Technical Lead	Meegan Nagy	$ 90.00	$ 146,800.00
Sr. Engineer	Melissa Kieffer	$ 90.00	$ 102,700.00
Sr. Geologist	Lewis Hunter	$ 105.00	$ 61,300.00
GIS Analyst	Scott Gregory	$ 90.00	$ 17,100.00
Database	TBD	$ 90.00	$ 31,800.00
Intern	TBD	$ 52.00	$ 15,100.00
Draftsman	Glenn Cox	$ 59.00	$ 13,000.00
Technical Editor	Shelley Scarich	$ 83.00	$ 3,500.00
Clerical	David King	$ 47.00	$ 4,100.00
Supervision		-	$ 23,200.00
Sub-total			$ 418,600.00
Travel			$ 10,150.00
Miscellaneous			$ 20,800.00
Total			**$ 450,000.00**

Funding and % time are based on a 15-month time frame from 1 January 2002 to 1 March 2003.

6.0 ASSUMPTIONS

A number of assumptions have been made prior to conducting this groundwater study. It is assumed that:

- various stakeholders already have existing well and nutrient concentration data compiled into either a database or spreadsheet format. Most of the data compilation effort for this study is assumed to be gathering the various stakeholders information into a uniform system;
- there is expected to be minimal data that has not yet been compiled electronically;
- the data needed to complete the study as scoped exists and are accessible;
- available data is manageable;
- a GIS system has been developed with basic information such as topographic maps of Lake Tahoe, orthophotographs, county boundaries, watershed boundaries, etc.;

- the information collected can be added to the current GIS as additional layers;
- there is a potential groundwater problem; the extent of the problem being unknown at this time.

7.0 RISKS

There is a risk that enough data gaps will exist that only extremely broad evaluations can be achieved. There is also a risk that the format of the data collected will not be fully compatible with the Tahoe Information Management System (TIMS). TIMS is also in the early stages of development and may not be fully functional at the time of reporting so the Corps may establish its own format in consultation with the stakeholders.

- If there is no established GIS system, there is a risk that unanticipated effort (data input, database management, etc.) will be required to adequately establish this system to meet the data presentation needs. This extra effort could require additional time, funding or change in scope.
- There is a risk that data available are so extensive that additional time and funding will be needed to gather and compile it all or that data collected may not be complete.
- There is a risk that the types of data needed to evaluate regional groundwater flow does not exist and would not be obtainable without additional field work and/or sample collection.
- There is a risk that not all land use types have associated groundwater nutrient data. In this instance, assumptions will be required to estimate nutrient loading from specific land use types.

8.0 KEY RESOURCE REQUIREMENTS

The key resources for this study are:

Title	Resource	Phone
Project Manager	Phillip Brozek	916-557-7630
Technical Team Lead	Meegan Nagy	916-557-7257
Sr. Environmental Engineer	Melissa Kieffer	916-557-7369

Sr. Geologist	Lewis Hunter	916-557-5368
GIS/Database Manager	Scott Gregory	916-557-5308
Technical Editor	Shelley Scarich	916-557-7955
Draftsman	Glenn Cox	916-557-7188

9.0 CONSTRAINTS

The study is limited by a budget of $450,000 and a final deadline of 30 June 2003 for completion of the Final Special Framework Groundwater Study Report. The study is also limited by the quality, quantity, and accessibility of existing information.

10.0 INTERRELATED PROJECTS

CDM is conducting a study on the shore zone sewer systems in association with various local public utility districts. Urban storm water issues are being studied by CDM. The Water Board is developing the TMDLs for the Lake Tahoe Basin in coordination with contractors and other local agencies. TRPA is in the process of updating the Regional Plan and the U.S. Forest Service is updating their Forest Management Plan.

11.0 ACCEPTANCE CRITERIA

This special framework groundwater study will be accepted when the customer is satisfied, the Science Advisory Group has agreed to the conclusions and content of the study and the legislative representatives are satisfied.

12.0 CUSTOMERS AND STAKEHOLDERS

Customer/ Stakeholder	Contact	Address	Phone
Lahontan Regional Water Quality Control Board	Jeremy Sokulsky	2501 Lake Tahoe Blvd. South Lake Tahoe, CA 96150	(530) 542-5463

Customer/ Stakeholder	Contact	Address	Phone
Lake Tahoe Research Group	John Reuter	Department of Environmental Science and Policy University of California-Davis One Shields Avenue Davis, CA 95616-8576	(530) 304-1473
Tahoe Regional Planning Agency	Larry Benoit		
Camp Dresser & McKee	Coral Cavanagh		(916) 567-9900
Lake Tahoe Transportation and Water Quality Coalition			

13.0 REVIEWS

The initial review will be conducted by Environmental Design Section and the Tahoe Groundwater Study Team. Independent technical review will be conducted by the Science Advisory Group (SAG), a multi-disciplinary, multi-agency scientific group in the Tahoe Basin.

14.0 COMMUNICATION PLAN

	Scope of Work	Technical Project Management Plan	Interim Study Update	Special Framework Groundwater Study Report	Feasibility Scoping Meeting	Alternative Formulation Briefing	District Engineer's Public Notice
Sacramento District Groundwater Study Team	X	X	X	X	X	X	X
South Pacific Division		X	X	X	X	X	X
Water Board/Lake Tahoe Research Group	X		X	X			
TRPA	X		X	X			

15.0 CHANGE MANAGEMENT PLAN

Minor changes will be handled by the technical team leader. The project manager will be notified of any minor changes through email. Examples of minor changes in scope are considered:

- Minor cost increases ($0 to $2,000);
- Minor schedule adjustments (1 week or less) that do not affect the final report date; and
- Process changes that do not affect overall scope or deliverable.

Major changes will be handled by the project manager. The technical team leader will inform the project manager of any requested major changes and request action and/or a decision. Examples of major changes are considered:

- Cost increases in excess of $2,000;
- Major schedule adjustments (greater than 1 week) that could effect major milestones or the final report date;
- Modifications to types of deliverables; and
- Changes in overall scope.